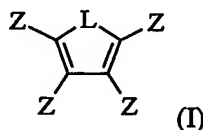


## WHAT IS CLAIMED IS:

1. A compound comprising i) one or more dienophile groups (A-functional groups), ii) one or more ring structures comprising two conjugated carbon-to-carbon double bonds and a leaving group L (B-functional groups), and iii) one or more chemically bound mesogenic poragen forming moieties, characterized in that the A-functional group is capable of reaction under cycloaddition reaction conditions with the B-functional group to thereby form a cross-linked, polyphenylene polymer.

2. A compound according to claim 1 corresponding to the formula,



wherein L is -O-, -S-, -N=N-, -C(O)-, -(SO<sub>2</sub>)-, or -OC(O)- ;

Z is independently in each occurrence hydrogen, halogen, an unsubstituted or inertly substituted hydrocarbyl group, Z''X, or two adjacent Z groups together with the carbons to which they are attached form a fused aromatic ring,

Z'' is a divalent derivative of an unsubstituted or inertly substituted hydrocarbyl group joining two or more structures of formula (I), or joining an A-functionality, a bound mesogenic poragen forming moiety, or a moiety comprising both an A-functionality and a bound mesogenic poragen forming moiety,

X is a second structure of formula (I), a moiety comprising A-functionality, a group comprising a mesogenic poragen forming moiety, or a moiety comprising both an A-functionality and a mesogenic poragen forming moiety

and in at least one occurrence, Z is a Z''X group of the formula: -Z''-C≡CM; or

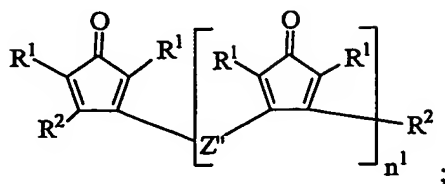
in at least one occurrence, Z is a Z''X group of the formula: -Z''-C≡CR and in at least one other occurrence Z is a Z''X group comprising a mesogenic poragen forming moiety;

wherein,

M is independently each occurrence a bound mesogenic poragen forming moiety; and

R is independently each occurrence selected from the group consisting of hydrogen, C<sub>1-4</sub> alkyl, C<sub>6-60</sub> aryl, and C<sub>7-60</sub> inertly substituted aryl groups.

3. A compound according to claim 2 corresponding to the formula:



wherein  $\text{R}^1$  independently each occurrence is  $\text{C}_{6-20}$  aryl,  $\text{C}_{6-20}$  inertly substituted aryl, or  $\text{R}^2$ ;

$\text{R}^2$  is  $\text{C}_{6-20}$  aryl- substituted ethynyl,  $\text{Z}''\text{-M}$ ,  $\text{C}_{6-20}$  aryl, or  $\text{C}_{6-20}$  inertly substituted aryl;

$\text{Z}''$  is a divalent linking group, and

5  $\text{M}$  is a bound mesogenic poragen forming moiety,

$n^1$  is a number greater than or equal to zero;

with the proviso that in at least one occurrence  $\text{R}^1$  or  $\text{R}^2$  is  $\text{C}_{6-20}$  aryl- substituted ethynyl, and in at least one other occurrence  $\text{R}^1$  or  $\text{R}^2$  is  $\text{Z}''\text{-M}$ .

4. A compound according to claim 3 wherein

10  $\text{R}^1$  and  $\text{R}^2$  groups are independently selected from the group consisting of:  $\text{C}_{6-20}$  aryl- substituted ethynyl,  $\text{Z}''\text{-M}$ ,  $\text{-C}\equiv\text{C-M}$ ,  $\text{C}_{6-20}$  aryl, and inertly substituted  $\text{C}_{6-20}$  aryl;

$\text{Z}''$  is selected from the group consisting of: phenylene, biphenylene, phenyleneoxyphenylene, ethynylene, -phenylene- $\text{C}_{1-12}$  alkylene-, -phenylene- $\text{O-C}_{1-12}$  alkylene-, -phenylene- $\text{C}_{1-12}$  alkylene- $\text{O-}$ , -phenylene- $\text{O-C}_{1-12}$  alkylene- $\text{O-}$ , -phenylene- $\text{CO-}$ ,  
 15 -phenylene- $\text{O-}$ , -phenylene- $\text{OC(O)-}$ , -phenylene- $\text{C(O)O-}$ , -phenylene- $\text{C(O)-NH-}$ , -phenylene- $\text{NH-C(O)-}$ , -phenylene- $\text{OC(O)O-}$ , -phenylene- $\text{NHC(O)O-}$ , -phenylene- $\text{OC(O)NH-}$ , -phenylene- $\text{NHC(O)NH-}$ , -phenylene- $\text{C}_{1-12}$  alkylene- $\text{C(O)O-}$ , -phenylene- $\text{C}_{1-12}$  alkylene- $\text{C(O)NH-}$ , -phenylene- $\text{C}_{1-12}$  alkylene- $\text{OC(O)-}$ , -phenylene- $\text{C}_{1-12}$  alkylene- $\text{OC(O)NH-}$ , -phenylene- $\text{C}_{1-12}$  alkylene- $\text{NHC(O)O-}$ ,  
 20 -phenylene- $\text{C}_{1-12}$  alkylene- $\text{OC(O)O-}$ , -phenylene- $\text{C}_{1-12}$  alkylene- $\text{NHC(O)NH-}$ , -phenylene- $\text{O-C}_{1-12}$  alkylene- $\text{C(O)O-}$ , -phenylene- $\text{O-C}_{1-12}$  alkylene- $\text{C(O)NH-}$ , -phenylene- $\text{O-C}_{1-12}$  alkylene- $\text{OC(O)-}$ , -phenylene- $\text{O-C}_{1-12}$  alkylene- $\text{OC(O)NH-}$ , -phenylene- $\text{O-C}_{1-12}$  alkylene- $\text{NHC(O)O-}$ , -phenylene- $\text{O-C}_{1-12}$  alkylene- $\text{OC(O)O-}$  and -phenylene- $\text{O-C}_{1-12}$  alkylene- $\text{NHC(O)NH-}$ ; and

25  $\text{M}$  is a discotic mesogenic poragen forming moiety.

5. A cross-linked polymer formed by curing a composition comprising a compound according to any one of claims 1-4.

6. A porous matrix formed by removing of self-assembled poragens formed from bound mesogenic poragen forming moieties in the cross-linked polymer of claim 5.